What Is a Current Mirror?

A current mirror is an electronic circuit that generates an output current that closely matches an input or reference current.

It is commonly used in analog circuits for biasing, current sources, and differential amplifiers.

Basic Current Mirror Circuit:

The simplest current mirror consists of two transistors (usually MOSFETs or BJTs).

One transistor (the reference transistor) establishes a fixed current (Iref).

The other transistor (the output transistor) mirrors this current to produce an output current (Iout).

Simulation with LTSpice:

LTSpice is a powerful circuit simulation tool.

To simulate a current mirror:

Set up the circuit with appropriate transistor models.

Define the biasing conditions (e.g., supply voltage, resistor values).

Run a DC analysis (operating point analysis) to find the steady-state currents.

Observe the output current (Iout) and verify its relationship with the reference current (Iref).

Applications:

Biasing: Ensures transistors operate in desired regions (e.g., active, cutoff, saturation).

Reference Currents: Provides stable reference currents.

Amplifier Design: Used in differential amplifier stages.

Current mirrors are fundamental building blocks in analog design. By simulating them, engineers gain insights into circuit behavior and optimize their designs.